

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



REC'D 27 JUN 2005

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Applicant's or agent's file reference OPP030181KR	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/KR2004/000520	International filing date(day/month/year) 12 MARCH 2004 (12.03.2004)	Priority date (day/month/year) 13 MARCH 2003 (13.03.2003)	
International Patent Classification (IPC) or national classification and IPC IPC7 H01L 21/324			
Applicant SAMSUNG ELECTRONICS CO., LTD. et al			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
- a. ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:
- ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
- ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
- b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____ containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
- ☒ Box No. I Basis of the report
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 13 SEPTEMBER 2004 (13.09.2004)	Date of completion of this report 03 JUNE 2005 (03.06.2005)
Name and mailing address of the IPEA/KR  Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer MAENG, Sung Jae  Telephone No. 82-42-481-5727

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language _____ which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
 - ☒ the international application as originally filed/furnished
 - ☐ the description:
 - pages _____ as originally filed/furnished
 - pages* _____ received by this Authority on _____
 - pages* _____ received by this Authority on _____
 - ☐ the claims:
 - pages _____ as originally filed/furnished
 - pages* _____ as amended (together with any statement) under Article 19
 - pages* _____ received by this Authority on _____
 - pages* _____ received by this Authority on _____
 - ☐ the drawings:
 - pages _____ as originally filed/furnished
 - pages* _____ received by this Authority on _____
 - pages* _____ received by this Authority on _____
 - ☐ the sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages _____
 - ☐ the claims, Nos. _____
 - ☐ the drawings, sheets _____
 - ☐ the sequence listing (*specify*): _____
 - ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages _____
 - ☐ the claims, Nos. _____
 - ☐ the drawings, sheets _____
 - ☐ the sequence listing (*specify*): _____
 - ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation to restrict or pay additional fees the applicant has:
- ☐ restricted the claims.
 - ☒ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees:

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is :

- ☐ complied with.
- ☒ not complied with for the following reasons:

- I. Claims 1-4, 6-11, 13-14, 16-18, and 20-27 directed to a crystallization apparatus and method of amorphous silicon.
- II. Claims 5 and 15 directed to an amorphous silicon layer.
- III. Claims 12 and 19 directed to an sequential lateral solidification(SLS) method.

The special technical features of group I relate to a crystallization apparatus and method of amorphous silicon while the special technical features of group II relate to an amorphous silicon layer and that of group III relate to an SLS method.

However, the search has been revealed that an amorphous silicon layer and an SLS method are not novel since they are disclosed in documents of US 03/24905 A1 (Koichiro Tanaka) 06 February 2003 and WO 02/86954 A1 (Trustee of Columbia University) 31 October 2002.

Consequently the common features(amorphous silicon and SLS method) are not special technical features within the meaning of PCT Rule 13.2, second sentence, since it makes no contribution over prior arts.

Therefore, there is no other feature common to all the Claims. Since there exists no other common feature which can be considered as a special technical feature within meaning of PCT Rule 13.2, second sentence, no technical relationship within the meaning PCT Rule between the different inventions can be seen.

Consequently it appears that a posteriori, Claims 5, 12, 15, and 19 do not satisfy the requirement of unity of invention.

4. Consequently, this report has been established in respect of the following parts of the international application :

- ☒ all parts.
- ☐ the parts relating to claims Nos.

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-27	YES
	Claims	none	NO
Inventive step (IS)	Claims	9-11, 13-14, 16-18, 20-27	YES
	Claims	1-8, 12, 15, 19	NO
Industrial applicability (IA)	Claims	1-27	YES
	Claims	none	NO

2. Citations and explanations (Rule 70.7)

The invention relates to: an apparatus and method of crystallizing amorphous silicon; amorphous silicon layer; and an SLS method.

Following documents have been cited in the International Search Report:

- D1: US 03/24905 A1 (Koichiro Tanaka) 06 February 2003
- D2: KR 02-94062 (NEC) 16 December 2002
- D3: WO 02/86954 A1 (Trustee of Columbia University) 31 October 2002
- D4: US03/42397 A1 (Koichi Tatsuki et al.) 06 March 2003
- D5: JP05-226275 (NEC) 03 September 1993

1. D1 provides a laser device, a laser irradiating method, and a manufacturing method of a semiconductor device. A laser irradiating device disclosed in D1 is constructed of plural lasers, an optical system, and a stage for moving positions of the laser beams. D1 describes an SLS method of amorphous silicon in the related art.

2. D2 discloses a laser crystallization method of amorphous silicon by controlling pulse width. The Figure 2 in D2 discloses a system comprising two lasers, an optical unit, and a moving stage for mounting a substrate in a chamber.

3. D3 discloses a method and system for processing a silicon thin film sample on a substrate. An irradiation beam generator is controlled to emit successive irradiation beam pulse at a predetermined repetition rate. D3 also describes an SLS process of amorphous silicon.

4. D4 discloses a method of fabricating a thin film transistors by crystallizing an amorphous silicon film, and a laser annealing apparatus comprising: a plurality of semiconductor laser devices; optical devices; and a moving stage for mounting a substrate.

5. D5 discloses an apparatus of laser annealing. The apparatus comprises an X-Y table for mounting a substrate, two laser sources, optical units, and beam synthesizers.

However, the documents D1-D5 does not suggest a plurality of chambers wherein one of chambers loads a substrate while another of the chambers performs polycrystallization.

The invention claimed in claims 1-27 is considered to be novel and industrial applicable.

However, the search has been revealed that an amorphous silicon layer and an SLS method are not considered to have inventive step since they are disclosed in documents of D1-D5.

Claims 1-8, 12, 15, and 19 are considered to be lack of inventive step over the admitted prior arts of combination of D1-D5.